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EDITORIAL

The Botany Section. We are very glad to note that the Botanical Section, with the Herbarium attached to it, has been given once again the recognition and importance which it was having till the year 1928. Up to that period the Lecturing and Systematic Botanist was the Head of the Botany Section and was in charge of teaching Botany at the Agricultural College, Coimbatore, and at the same time had to look after the collection and identification of specimens from all over the Madras Presidency, for the formation of a representative Herbarium with the ultimate idea of writing up the Flora of the Presidency. This became an accomplished fact with the publication of the Flora of the Presidency of Madras by Gamble (begun by the late Gamble and finished by C. E. C. Fischer, both of the Madras Forest Department), the specimens for the publication being mostly furnished by the Madras Herbarium. To the layman Botany very often means little more than a highly technical study of the families of flowering plants with little of human interest in it. It is unfortunately a very mistaken notion. No doubt an observation of floral characters, a critical study of the internal structure of plant parts and of leaf forms, etc., leads a student towards accurate observation but he constantly asks himself "what is the use of all this?" The students' interest in the subject attains its full measure only when the flesh on the "dry bones" is supplied by the professor by pointing out to them the use man makes of the various plants about him and shows them pressed herbarium material or preserved specimens of important plants of other countries also which are in use in daily life. In fact the Herbarium plays a much more important part than a museum. It is the Systematic Botany Section that has been dealing with economic enquiries and is in fact the only clearing house for all botanical information which do not come within the purview of Crop Specialists.

About the year 1910 when the Agricultural College and Research Institute was transferred to Coimbatore from Saidapet, the Botanical Section was in charge of the late Dr. Barber with a number of assistants under him. He had control of both research and teaching of Botany, Mycology and Entomology. The Botany Section was the parent nucleus which divided and divided to form daughter cells which have become now the Sections of the four Crop Specialists, Mycologist and Entomologist. The parent Section continued to be an independent one with the Lecturing and Systematic Botanist as its head till the teaching was separated when the Lecturer in Botany went under the Principal as a member of the teaching staff and the Herbarium under the same officer for administrative control, and thus it

lost its individuality. In August 1938, when teaching and research were amalgamated, the Lecturing and Systematic Sections became one but only to be under the control of the senior Crop Specialist. Once again in 1942 it has been made an independent Section.

Mention was already made about the publication of the Flora of the Presidency of Madras by Gamble. Contributions describing the flora of several districts were made to the gazetteers. The survey and complete description of the common fodder grasses and weeds of South India were made and have resulted in the publication of two valuable books on them. Exhaustive and detailed morphological and histological studies of local specimens enabled the writing of a very popular Manual of Botany for Indian students by the late Dewan Bahadur K. Rangachariar and this book has gone through three editions. A survey and collection of the different varieties of bananas both wild and cultivated in South India have been made. They are being studied and a classification has been attempted. At present in addition to the routine work of identification of plants and answering economic enquiries, a good deal of attention is being given to the study and investigation of best fodder grasses and forage plants. It is hoped that this important Section will gain more strength in number as its scientific value can at no time be belittled and there is much work to do, especially at a time when shipping difficulties exist, and we have to strain our nerves in exploiting all our plant wealth, and supply material to suit the needs of the Departments of Agriculture, Forest and Medical and other industrial concerns.

Grow more food crops. We have to write once again on this subject as the problem of problems, especially to-day when the war is at our very threshold, is the food problem. The latest census figures indicate a rise in our population from 350 to 400 millions which by itself makes a greater demand on the supplies of our country. While the population has increased by fifty more millions, the area under rice has remained the same and what is more appalling we are dependent on an import of two and a half million tons of rice from Burma and Siam. That this import is unthinkable at present is known only too well to everybody. What is more, when the scene of action is nearing our stores, it is just possible that transport facilities might not be available except for urgent war needs such as transport of troops, etc. So it is imperative on our part that every part of our country grows as much food crops as it could possibly raise so that if communications are cut off, the necessity for depending on food from other parts may not at all be felt. What one could do is to restrict our area under short staple cotton for which there is now no market, grow only medium and long staple cotton and devote the area saved thereby for growing food crops. In this connection, we appeal to the readers of this Journal to throw as much light as they can on this problem and suggest ways and means of growing more food crops in place of other crops—the so-called money crops—whereby the farmer should be able to support himself and help his brethren in this hour of need.

The Cultivation of Dry Paddy in the Salur Taluk, Vizagapatam District.

By P. SOMAYAJULU,

Agricultural Demonstrator, Salur.

The hilly tracts and the plains of the Salur Taluk in the Vizagapatam District abound in good dry paddy varieties. Two of these viz., *Vedurusannam* and *Mettu dhanyarasulu* are cultivated on a large scale. There are other varieties, *Mettu prayaga* and *Mettu budagalu,* which are also popular. During recent years *Kasipichodi* and *Seethamma savaralu* (probably *Seethasalo* of Orissa) are found among the dry paddy.

There is an area of about 1,000 acres under dry paddy during the current year in the taluk including the hilly area for which no statistics are maintained. Owing to the fall in the price of groundnut, and on account of propaganda for growing more food crops, the area under food crops has increased, partly replacing groundnut. In the following note the important practices in the cultivation of dry paddy are given together with a comparative statement of the cost of cultivation and yield of groundnut and dry paddy to show the advantages of cultivating the latter in these days.

Climate and rainfall. The average rainfall of the taluk is about 45 in. of which about 26 in. are received during the South West monsoon and about 14 in. during the North East monsoon. Dry paddy is cultivated in the South West monsoon period when the maximum rainfall is received.

Soils, preparatory cultivation and rotations. The soils of the taluk vary from red loams to black clays and in all these soils dry paddy is cultivated. *Mettu prayaga* and *budagalu* are mostly confined to the black clays while *Mettu dhanyarasulu* and *Vedurusannam* are cultivated in red loamy soils. Probably the former require more moisture than the latter and hence their cultivation is largely found in the black clays which are more retentive of moisture than the red soils. The land is ploughed thoroughly with the summer rains, cattle manure is applied and incorporated in the soil. The general practice is to pen sheep in the land, as cattle manure is not available in large quantities. The following is the rotation generally adopted :—

I Year	Groundnut	May to September.
II Year	Dry paddy	June to September.
	Horsegram or Greengram	October-January.
III Year	Groundnut	May-September.
	Horsegram	October-January.

If dry paddy is intended to be grown after groundnut the land is allowed to weather and is ploughed as often as possible; otherwise a crop of horsegram follows groundnut. Dry paddy is followed by horsegram or greengram.

Seeds and sowing. With the onset of the South West monsoon which is generally in the "*Mrugasira Karthi*" (middle of June) seed is sown broadcast either as a pure crop or as a mixture with *Tella jonna* or redgram and covered with the ordinary wooden plough. When sown pure about 40 lb. of seed is used and when sown as mixture 30 lb. is the seed rate per acre. In some villages there is the practice of raising seedlings in a seedbed and transplanting them. About 10 cents of the seed-bed is well ploughed and manured and about 30 lb. of seed is sown in the middle of June. The field to be planted is ploughed well in the meantime and when it is in the right condition the seedlings are transplanted in the plough furrow behind the plough, another plough following it covering the roots. This practice is similar to the one obtained in the case of *jonna*[1] or *ganty*[2]. As the planting is done in the rainy month of July the seedlings establish themselves well. The advantages of this method over broadcasting are the following:—

Reduction in the quantity of seed used; regularised spacing between the plants, thus giving them more chances for tillering well; and minimising the presence of seeds and thus reducing the weeding expenses. But there is a risk in this method. If there be a failure of rains after transplanting, the crop fails. Hence generally *ryots* do not take the risk and broadcasting is the more popular practice.

After-cultivation. Generally weeds crop up from seeds brought in through the manure applied to the land. They are removed about a month after sowing and the land is hoed well. A second hoeing is also given at a suitable time later on.

Harvesting and threshing. The crop comes to harvest by the end of September or in the first week of October. Threshing is done immediately if weather permits or put off to November, when the weather gets cleared. In normal years, about 1,000 to 1,500 lb. of grain are obtained from an acre.

Economics of cultivation of dry paddy and groundnut.

Expenditure.	*Groundnut.*			*Dry Paddy.*		
	Rs.	as.	ps.	Rs.	as.	ps.
Preparatory cultivation:—						
Four ploughings	3	0	0	3	0	0
Manures and Manuring:—						
Sheep penning	2	0	0	4	0	0
Seeds and Sowing:—						
Kernels 30 lb.; 4 pairs and 4 women ...	3	8	0			
40 lb. of paddy and 2 pairs ...				2	0	0
Interculturing:—						
Hoeing I—10 women ...	1	4	0			
„ II—10 „ ...	1	4	0			
Weeding I—10 women ...				1	4	0
do. II—8 do. ...				1	0	0

1. Sorghum. 2. *Pennisetum typhoides.*

Expenditure.		*Groundnut.*			*Dry Paddy.*		
		Rs.	as.	ps.	Rs.	as.	ps.
Harvesting :—							
For digging 6 men and for picking pods 16 women		3	8	0			
For harvesting paddy—8 women ...					1	0	0
Threshing with cattle ...					1	0	0
Land rent payable to the Zamindar ...	...	1	4	0	1	4	0
Total	...	15	12	0	14	8	0
Receipt :—							
Value of 1250 lb. of groundnut	...	37	8	0			
Value of 1200 lb. of paddy	...				36	0	0
3 cartloads of straw	...				10	0	0
Total	...	37	8	0	46	0	0
Nett profit		21	12	0	31	8	0

It can be seen from the above statement that the cultivation of dry paddy is more profitable now, than the cultivation of groundnut. In the latter, there is always the risk of the market getting dull in which case the produce is stored for a long time with a hope of better times which is often not realised. Groundnut cannot be consumed as freely as a food crop. On the other hand, if there is no favourable market for paddy, it can be consumed by the grower.

Selection work has been undertaken in the varieties *Vedurusannam* and *Mettu dhanyarasulu* at the Agricultural Research Station, Anakapalli and some good strains are expected to be released shortly which will replace the local varieties.

Collective Farming

By K. VARADACHARI, B. Sc. (Ag.),

Agricultural Demonstrator, Gooty.

In the village of Peddaradugur in the Gooty Taluk (Anantapur District) there is an interesting system of collective farming, ideal in its organization and efficient in management. There are 36 acres of wetland irrigated by a spring channel, composed of 44 shares, each share being a unit of one head of working animal (Tel. *Pothu bagamu).* There are now 44 shareholders, some owning single shares, some others a little more or less than a share. One of the shareholders, Bayyanna by name, is the chief man of the organization, by virtue of heredity. For the past several generations Bayyanna's family have been the leaders of this organization. In the village Revenue Registers the *patta* is shown as a common one in the name of "Bayyanna and others". No one member of this organization has any right to any particular portion of this block of 36 acres and cannot say that this portion or that portion of this block is his, or that he would cultivate that area only. Nor has he any right to sell his share of the land; he can sell only his right to his share of the produce, that is to say, on selling his

right he ceases to be a shareholder and the purchaser will step into the scheme. No registration is done, the seller passes on his paper to the purchaser. These 44 persons work together, divide the expenses and divide the net produce among them according to their shares whether the entire block or only a part of it is cultivated.

Bayyanna organizes the work, arranges for labour, the clearing of the silt and sand from the channel, manuring, sowing, weeding, harvesting and the innumerable other sundry items that normally form the routine work of the *ryot*, but as a whole for the entire 36 acres. As the time approaches for each operation, he sends word to the other 43 share holders (he is himself the 44th) and they all come and attend to the work, by contributing personal or cattle labour, according to the number of shares held by each. A man holding a full share, works every day, a man having half a share does half work, i. e., works for 4 days out of 8 days and a man having a quarter share works for 2 days and is free for 6 days. The channel is cleared all working together, and if any one is absent he pays a penalty of 4 annas a day. Twenty-two pairs of animals (at half a pair per share for 44 shares) puddle the 36 acres. Each shareholder contributes 6 cartloads of cattle manure and proportionate quantity of seed. Late-comers for work pay a fine of one measure grain ($1\frac{1}{2}$ seers = 1 m.m. of $2\frac{1}{2}$ lb.). Fines in kind are collected at the end of the season. When extra labour is required for weeding, harvesting, etc., they are employed and debited to the whole block. At such times a clerk is engaged for keeping accounts and is paid 64 seers grain as a lump amount for his labours.

From the time of the harvest when the produce is taken over to the thrashing floor up to the completion of thrashing, cleaning, etc., all the 44 shareholders watch together on the thrashing floor. When the produce is ready, the assessment is first paid by selling the required grain to meet the demand which is Rs. 180. Bayyanna holds himself responsible for the payment of the *kist*. After that is paid, the charges are met one by one, the clerk's wages, the village *mamool* for carpenter and blacksmith, wages for the man who guides water, the watchman, and the payment due to the two village temples. Finally, the net produce is divided equally among the 44 shares. Fines in grain are then collected and together with any fines in cash are distributed among the others. Thus ends the season with amicable combination of work.

What does Bayyanna get? He has not got to work himself, but stands in the bund with stick and supervises labour. With a word of encouragement here and reprobation there, he is respected and obeyed. His decision in all matters of quarrel is final and binding. His acceptance is required for transfer of a share from one to another since he has to satisfy himself that the new shareholder will be amenable to the unwritten rules of this organization. His monetary remuneration is about Rs. 5 obtained by the leasing of the grass in the field bunds.

Marketing of Fruits with Special Reference to Grapes in the Madura District and Suggestions for its Improvement.

By G. VENKATAKRISHNAN, B. Sc. (Ag.)

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Introduction. Of late, there has been a cry from scientists and leaders of thought "Grow more fruits" and "Eat more fruits". Experts in dietetics are also of opinion that at present the use of fruits as one of the items of our daily food is quite inadequate and that deficiency of fruits and fruit products in the diet is highly detrimental to the health of the people. The backwardness of the Indian farmer in adopting scientific methods of fruit growing is recognised as an impediment to the production of fruits on a large scale. The lack of marketing facilities and the proverbial ignorance of marketing conditions by the fruit grower, add to the deterioration of the fruit-growing industry. It is, therefore, considered necessary that for ensuring and stimulating the health of our people, improvements in scientific farming must go hand in hand with the improvement in the method and disposal of the produce. The marketing of fresh fruits, their transfer from the producers to the consumer, is an important and indispensable activity. It involves a varied and often complex distribution and sales system, and it is usually costly. It is due to the uncertainties of the trade, the risks involved and the various services performed in modern distribution and marketing. Accordingly the difference in price between what the grower receives for his product and what the consumer pays is often considerable indeed. Marketing of fruits is attended by various groups of people, buyers, wholesalers, jobbers, retailers, etc. Each successive middleman specialises to some extent in a particular function and service. There is, however, considerable overlapping in the activities of the various agencies and a continuous adjustment in methods of distribution especially since the advent of the use of motor bus, lorries and train service in transportation. The system is sometimes made simpler by a "link" or middleman being dropped out, but occasionally it becomes more complex due to the necessity of interposing a new agency between the existing ones.

Taking fruit marketing in the aggregate one may recognise three general ways of disposing of the crop. (1) selling at home or locally; (2) marketing at a distance in the city and (3) exporting to foreign markets. If circumstances justify, the grower may use only one type of marketing continuously and profitably.

An attempt is made in this paper to present in detail the existing system of production and distribution of grapes and to suggest improvements in the organisation of its disposal. In the Madras Presidency, grapevine is cultivated on a large scale in and around Michaelpalayam village in

Nilakottai of the Madura District, Krishnagiri in the Salem District and Penukonda in the Anantapur District. These three areas are peculiarly favoured with a climate suitable for the production of grapes.

Grapes were first introduced in and around Michaelpalayam by the Jesuit Fathers about 50 years ago. Vine growers are mainly *Vanniya* Christians. Especially during the last twenty years, the Agricultural Department has been in close touch with grapevine cultivation in that area. Co-operation of the grower with the Department has resulted in increased out-turn of produce to about 400 baskets (each basket weighing 25 lb.) per acre in the two fruiting seasons, and also in the yearly increase in acreage under cultivation. March to June and October to December are the two grape harvesting seasons, seven months being the period of harvest in a year.

In and around Michaelpalayam, each cultivator invariably raises grapes in about 40 to 50 cents of his holding. . The maximum extent of the garden will be about 3 acres. Through proper care and attention the grapevine gardens once started can be kept on for about 30 years. The vines begin to yield even from the second year. But regularly heavy harvests are obtained between the seventh and twenty-fifth year. Of the two harvests in a year, the summer crop is always heavy and sweeter than the cold season crop. The yield per acre of a vine garden in a year is about 400 baskets or 10,000 lb. in both the seasons put together.

All the fruits produced are usually railed for sale to various towns in this Presidency. The fruits are sent up to Calicut, Mangalore and Trivandrum in the South and as far as Rajamundry in the North. For short distances fruits are sent in baskets only and to distant places mud pots are used as containers. The whole quantity of fruits are disposed off with the help of fruit merchants at the producing centre who are merely forwarding agents employed by the wholesale merchants in towns and cities. These forwarding agents are also owners of grapevine gardens. Before the commencement of the harvest season, the forwarding agents borrow money from the wholesale fruit merchants in towns and cities like Madras, Trichinopoly, Tanjore and Madura, and distribute it to the gardeners for their expenses with the stipulation that they should sell their produce to them. It thus happens that each forwarding agent at the place of production has a number of gardeners as his debtors, who in turn are expected to show some concession to the forwarding agents in the matter of price. The forwarding agents either purchase the standing crop on contract outright or periodically purchase the fruits at fixed rates from these gardens. In either case they advance a certain amount of money before hand and settle the accounts of the gardeners part by part even till the next harvest. In most cases they do not pay the gardeners in full as per contract, but withhold large sums of money on the pretext that they have incurred losses in the transactions. It is only very rarely that the amounts are paid in full as per agreement.

The forwarding agents are in turn exploited by the wholesale fruit merchants in towns and cities. The forwarding agents have to keep up to their contract to supply fruits to the particular merchants who have advanced them money and to accept the price quoted in the invoice. The agents have to spend large sums of money daily towards freight, packing and incidental charges on the consignments of fruits despatched. In most cases the fruit merchants in towns and cities carry on this business on commission basis. The rate of commission goes up to three annas in the rupee on the sale proceeds in addition to deductions like charity, *mahimai*, etc. To add to all these the accounts that these merchants render to the agents are anything but satisfactory. Usually the invoice received from the fruit merchants do not give the actual price of sales. For instance a basket might have been sold for Rs. 2 and in the invoice the selling price may be Rs. 1—8—0 only. The forwarding agents have no other course but to accept the invoice as correct and true.

Thus it will be seen that the gardeners do not receive the equivalent of their labour and outlay. The remuneration that these forwarding agents receive is inadequate for the trouble and worry to which they are subjected. The individuals who obtain the maximum benefit are the fruit merchants in towns because they cleverly manage to pool and control the supply of fruits, to keep the producer and forwarding agents under their thumb and to regulate the market to suit their trade and purpose. In spite of all these drawbacks the vine-gardeners were able to realise fairly good income before the year 1932 as fruits were selling at Rs. 4 to 6 per basket according to the season. But during the years 1932 to 1938 the position became alarmingly serious as the price fell down to as low as one rupee per basket. The gardeners were unable to meet the ordinary expenditure like the renewal of *pandals* manuring and irrigation charges.

It was in course of time realised that by proper organization and efficient control attempts should be made to systematise the sale of grapes for the benefit of the producers and to regulate the market prices for the benefit of the consumers as well. Upon the success of such an organization depends the prosperity of the grower by the elimination of the middle men, brokerage and other wastage. This aspect of the problem and the enormous loss to the Indian agriculture came to the notice of the Royal Commission on Agriculture in India.

Guided by the above principles, attempts were made in the marketing of grapes in Michaelpalayam area during the early parts of 1938. A Co-operative Marketing Society called "The Michaelpalayam Fruit Growers' Co-operative Society" was formed with the help of the Provincial Marketing Officer, Madras. To start with, there were about 105 members. The Society was affiliated to the Madras Provincial Marketing Society. Necessary financial help was given by the Madura—Ramnad Central Co-operative Bank. Sufficient publicity was given to all the fruit merchants in the various towns regarding this new organization and the conditions of its business.

Kodaikanal Road Railway Station being the nearest booking station, the office of the Society was located there so as to enable easy transaction of business. The produce of the members was pooled daily near the station premises and were despatched to various merchants according to indents received from them day to day. The Society in consultation with the General Body and Directors selected merchants whom they knew already in the consuming centres. Only such selected merchants were supplied with fruits for sale on commission basis at one anna per rupee on the sale proceeds. Deductions like charity, *mahimai*, etc., were not permitted. In order to verify the price given in the invoices, the Agricultural Demonstrators in the various towns were circularised and requested to periodically report the prevailing prices for grapes in their respective places. The moneys realised by the sale of fruits were distributed to the members every week according to the number of baskets sold by each of them through the Society, after meeting the incidental charges and working expenses. During the season ending June 1938, 350,000 lb. of fruits worth about Rs. 23,000 were handled by the Society within a short period of 4 months, commencing from March to end of June. Towards the end of April there was a severe glut in the market since the produce of many gardens came to harvest at more or less the same time. During this period of glut, the prices fell down so low that in some instances the railway freight exceeded the price realised from the sale of the produce. The fruits had to be sent only through Mail trains, wherein, arrangements for free circulation of air, was absent.

Towards the beginning of the season, in order to see whether better prices could be secured by tapping new and fresh markets, the Society sent a few consignments of fruits to some of the North Indian towns like Lahore, Patna, Allahabad and Calcutta. But the Chaman grapes proved a formidable competitor to the South Indian grapes in the matter of price as well as quality and therefore further consignments to the North Indian markets had to be stopped. In spite of severe competition the gardeners who operated through the Society got decently fair price two to four annas more per basket over the sale price of non-members and ready cash for their fruits week after week. Towards the close of the season, some of the outstandings with the merchants could be collected only with some difficulty. Though the organization was in its infancy, the experiences gained in its actual working for one season has indicated the directions in which we have to bestow our attention further to reach perfection.

The following suggestions are worth considering :—

1. Reduction of railway freight. Considering the large quantity of grapes now sent by rail and the probable increase in the transport of this fruit the railway fares should be reduced to half the present rate. By doing so the Company may not lose much of its income because the transport of fruits and perishables in lorries and also on bus tops could be diverted to

2. In the railway vans arrangements for holding the fruit baskets in rows with sufficient space between for ventilation should be provided as against the present system of piling up baskets one over the other in a cramped up limited space resulting in the speedy rotting and decay of the commodity.

3. In order to prevent glut and many gardens coming to harvest at one and the same time the gardeners should be persuaded to so adjust the pruning operation that a regulated and limited supply of fruits are available on the market.

4. The merchants at the consuming centres should be *forced to take* out licenses and only men of status should be authorised to trade in fruits so that losses due to cheating can be minimised to the least possible level.

5. Efforts should also be made to eliminate competition between the Society and the non-members. All the garden owners should be persuaded to join the Society. There can be no doubt about the huge benefit that can be conferred upon the growers in their union in a co-operative organization.

Rural Sanitation.

By GULAM DASTHAGEER.

The old aphorism that "God made the country" would be blasphemous if we attribute to God the creation of the Indian villages as they are now. God did make the villages but only man made them insanitary. In a country like India where nearly 90 % of the people live in villages, the question of rural sanitation is of very great importance. The condition of the people of India as a whole cannot be bettered without paying due attention to the sanitation of the villages and the health of the large mass of village dwellers.

Though there has been a great deal of improvement in recent years, the condition of the villages in India is still very deplorable. The high death rate and the low average length of life in India is in no small measure due to the insanitary conditions prevailing in the villages.

There is dirt everywhere—potential breeding places for health destroying germs; the cattle are not kept in clean places; the wells or tanks which supply water for drinking purposes are used for washing and bathing; even the very person of the villager is not free from injurious and harmful dirt. The attention of the villagers should be drawn to these points and in them should be inculcated clean habits which would be conducive to good health. This will lead to better devotion to work and ultimately to prosperity all round.

The problem will be solved if each villager is meticulously careful about the cleanliness of his own person and dwellings. Personal hygiene will naturally play an important part in this. Bathing and wearing clean clothes, (not necessarily costly) and otherwise keeping the body clean will,

give an impetus to keep other things also clean. Comfortable but cheap dwellings should be built allowing sufficient light and air into the houses. The houses ought to be kept clean and no waste allowed to accumulate either inside or outside them. Everything arranged in an orderly manner in the house will lead to clean habits.

The disposal of rubbish and excreta ought not to be a problem at all. There is money in all these waste materials, such as plantain leaves, rags, sweepings and excreta. If all the rubbish collected from the house is dumped into big pits along with dung, etc., and covered with earth, after sometime the harmful waste materials will be converted into useful manure for the fields. Bore-hole latrines can be constructed cheaply and used by all the people including the children who should not be allowed to defaecate in streets, a very nasty and unhealthy habit which is chiefly responsible for the high incidence of the hook-worm disease in our villages. From these latrines valuable manure can be obtained if they are closed after sometime and others dug for use.

The villager must be taught to eat wholesome food which is absolutely essential for his well being. A correct appreciation of the value of food stuffs will enable the villager to get a balanced diet even for the very small amount he usually spends for his food. The necessity for consuming more milk and milk products must be emphasised. Water used for drinking purposes should first be filtered and well boiled as many diseases such as cholera, typhoid, dysentery and diarrhoea are spread by contaminated water. The villager must be made to realise the harm done by drinking toddy and other intoxicants.

Merely keeping the village and the villagers clean will not solve the problem of rural sanitation if medical facilities are not made available within the reach of every villager. There are many diseases which in spite of best precautions attack the people and sometimes take a heavy toll of life from the population. For preventing this there should be isolation of people suffering from contagious and infectious diseases. They should not be allowed to mix with other people, and proper medical aid should be given to them. Pools, marshes and all other places which allow water to stagnate in them should be filled up with earth so that mosquitoes may not breed.

Cattle should not be kept in small overcrowded houses where their excreta make the place filthy and detrimental to the health of the people. Separate sanitary sheds should be erected for the cattle which should be always kept clean. Their excreta should be removed and dumped into pits along with rotting leaves and other rubbish which ultimately provide very good manure. There should be a number of separate plots where the cattle can graze. These plots can be used by turns when the fodder in one gets exhausted. The cattle being well fed will do more work for the farmer,

Now, there remains only a very small part of the problem if each one of the villagers is particular about the cleanliness of himself, his dwelling, surroundings and his cattle. No one should dump all the rubbish from his house near the house of his neighbour in order to keep all the dirt away from his house. If every one does so there will accumulate near every house rubbish from his neighbour's house instead of rubbish from his own house and none would be any the better. By common consent and co-operation, the streets and lanes can be kept clean and all the rubbish removed to a big dump or for reclaiming marshy waste land. It is certainly necessary that the village as a whole should be clean if everyone is to be healthy. The wells and roads should be under the control of the whole village for without co-operation they cannot be kept in good condition. For achieving all this, literacy of the villagers is essential. Healthy surroundings and healthy life will make the villager hard working and happy. Happiness will in its turn psychologically improve the health of the people and this cycle will be going on to produce a race of villagers who will be the pride and the benefactors of a glorious regenerated India.

SELECTED ARTICLE

Plant Genetics as Applied to the Agricultural Industry in India.

"I trust that the day will come when humanity will take as great an interest in the creation of superior forms of life as it has taken in past years in the perfection of superior forms of machinery". So wrote Henry A. Wallace, the secretary of the United States Department of Agriculture in the sumptuous Year-Book of the Department for 1936 devoted to exploring the creative development of new forms of life through plant and animal breeding after a survey of superior germ plasm. Wallace's observations are of special import to India which is mainly an agricultural country. Its prosperity depends, therefore, to a great extent on the advancement made in efficient crop culture. The wide range of weather conditions in India distinguishes the different climatic tracts and the cultivation of varied food and industrial crops is rendered possible. Rice, sugarcane, wheat and cotton are some of the important crops and the less prominent ones include the millets, oil seeds and pulses. With the modern needs for intensive cultivation consequent on the limits imposed on the availability of cultivable land and the ever increasing pressure of the population, there is the necessity to turn to practical use the knowledge gained in the pure and applied sciences relating to agriculture.

The classical researches of Lawes and Gilbert on the mineral nutrition of plants have led the way for the augmentation of production by the application of artificial manures. The rediscovery in 1900 of Mendel's laws of inheritance has not only advanced the methods of plant breeding, but has also laid the foundations of modern genetics. Since then, a vast amount of intensive work has been done on the fruit fly *Drosophila* by T. H. Morgan and his school. The cytological researches conducted in the same fly and in maize and other plants enabled the deeper understanding of the science of genetics, with the establishment of the chromosome theory of heredity and the formulation of the 'gene' as the ultimate biological unit responsible for the expression of life in its various manifestations.

The application of this recent science is in the practical breeding of better plants and animals to the advancement of the agricultural industry. The criterion of improvement in any crop is primarily the increase brought about in the average yield or production per unit area and this could be achieved (i) by better cultural and manurial practices, and (ii) by producing better and robust forms of plants. Advances made in increasing the fertility of the soil would not be of full use if the crops raised happen to be inherently poor as a consequence of their unknown pedigree. The task of the breeder therefore becomes all important to provide the cultivator with the best material in the forms of pedigreed seeds and plants.

Scientific plant breeding takes cognizance of the fact that like morphological characters, economic characters are also inherited in the same way following the laws of heredity, though the theoretical analysis is greatly handicapped by the influence of environment. The most important method of the breeder that has yielded good results in India and elsewhere is *single plant selection.* A number of strains evolved in the various provinces. *viz.*, in paddy, the Coimbatore strains including G. E. B. 24, in wheat, L Pusa 4 and 12 and 8-A of Punjab, and in cotton, Co. 2 of Madras, V. 434 of C. P., and E. C. 593 in Ragi, are some of the examples to show the achievement by this method. An increase of yield from 10 to 20 per cent was found possible by this simple method of selection from the local cultivated varieties. The principle of this method is the establishment of a pure line by repeated self-fertilisation and selection, so that the progenies obtained are of the same constitution and further selection has no effect whatsoever.

The success of the single plant selection depends on the suitable choice of material. The greater the range of initial material, the greater will be the chances of producing the desired types. Present-day breeding in India has yet to take into account the far-reaching possibilities of exploring the various forms of the same cultivated crop obtainable in the different parts of the world. Soviet breeders were the first to realise this and by planned expeditions and exchange of materials by correspondence throughout the world they have obtained collections of all the plants grown or likely to be grown in the Soviet Union. These collections are classified and subjected to a thorough botanical, genetical and cytological study and represent museums of living material, the characters of which are known and available at any time for use as basic breeding material.

Till now plant breeders in India have no doubt made use of local collections and with the limitations thus imposed on the choice of material tried to combine useful available characters by *hybridisation.* By this means the scope of selection is widened beyond what was achieved by simple selection. With the materials available in the collection of different local varieties success has been achieved in Madras in the production of blast resistant rice, in Pusa of wilt resistant *arhar* and in Bombay of the wilt resistant cotton. Mention may also be made of the breeding in progress in Madras of rice forms resistant to flooding and lodging and in the United Provinces of the rice types that could evade the attack of the rice bug. A wider range of definite ecological and geographical races would certainly offer suitable plants for hybridisation for specific purposes. For a long time it was considered impossible to improve the local fibre flaxes of Northern Russia which are regarded as the best types of fibre flax. As a result of cyclic crossing of different ecological types it was found that a certain combination gave the desired type. In cotton the experience is that it is not possible to combine good quality lint and high ginning percentage. Cyclic crossing is attempted on a large scale at Coimbatore, and perhaps what could be achieved in Russia may also be obtained here provided the scope of the material is varied enough.

There are, however, great limitations to the obtaining of desired combinations of economic characters in the hybrid progenies. These are due to gametic and zygotic elimination (as pollen sterility and inviability of zygote or seed) characteristic in race or species crosses and gene linkage. With the assumption of large number of genes controlling the transmission of economic characters, one should expect all the theoretical number of combinations in a large F_2 population. Genetical and cytological researches have shown that due to the close linkage or grouping of genes controlling the quantitative characters in the different chromosomes and the restricted number of crossovers between the chromosomes, the obtaining of all possible combinations is greatly restricted. The nearest possible approach to the desired combinations could best be got by effecting crosses among the selections which are most like one parent in one desired character and most like another parent in another character desired.

The field of plant breeding by hybridisation was originally confined to varieties of the same species of cultivated plants. It has now come to be increasingly realised that greater possibilities in breeding could be realised by distant or wide crossing. The study of the distribution of cultivated plants by the Russian school has revealed that the original sources of distribution of cultivated types are from those places where a wealth of vigorous wild and related forms or species are found. The cultivated types have come into existence doubtlessly by special culture and attention by man to the exclusion of wild forms. *By virtue of their persistence and habitat in the rigorous conditions of climate and soil, the wild forms should possess some useful economic characters, such as resistance to drought and diseases, which if combined in the cultivated forms would greatly help to tide over unfavourable weather conditions, diseases and pests.

One of the most interesting stories in the history of plant breeding is the production of sugarcanes in Java resistant to diseases as *Sereh* and *Mosaic*. A Northern Indian wild form *Chunnee (Saccharum barberi)* taken from India by Kobus was found to be immune to the diseases and by hybridisation with local Java canes, immune types were obtained which saved the sugar industry of Java. The lead in the attempt at wide crossing in India has come from the Sugarcane Station, Coimbatore, where a wild species *S. spontaneum* was crossed with the noble canes *(S. officinarum)*. By introducing wild blood, Coimbatore was able to produce economic types which have spread not only throughout India, revolutionising its sugar industry, but in other continents like South Africa, Australia as well. The benefit that this country has gained by the growing of improved canes can easily be valued at several crores of rupees and can be cited as a notable example of plant breeding achievement in India.

Such a phenomenal improvement was found possible in sugarcane due to vegetative propagation where genetic purity is of no consideration. In seed propagated crops, such wide crosses are mostly sterile and the breeding of forms with the desired combination of characters is a big problem. In rice however it is interesting to note that later progenies of *Oryza sativa* (Rice) × *O. longistaminata* have given material of economic value though the cross and its immediately subsequent progenies were partially sterile. Other crosses with other wild forms have proved to be completely sterile. In cotton though crosses with Asiatic species and New World cottons are possible and have been tried, there are no records to show any valuable material having been obtained from such crosses.

For a while it looked as though the breeder faced a blind end in this alley of interspecific hybridisation. Cytological studies showed that the sterility of these hybrids is due to the non-homology of the parental chromosomes which prevented their normal conjugation essential for fertility. It was very early surmised,

by Winge that a doubling of the chromosomes in such hybrids could restore pairing and thereby fertility. The first practical example of such a phenomenon was in the sterile hybrid *Primula Kewensis* derived from *P. verticillata* and *P. floribunda*. An occasional seed produced gave rise to a fertile form of *P. Kewensis* which on cytological examination was found to have twice the number of chromosomes. Since the appearance of *P. Kewensis* similar cases have been reported revealing that such doubling occurred in nature occasionally and fortuitously.

The first economic plants raised by such doubling or amphidiploidy is the wheat-rye hybrids of Russia. These hybrids, in addition to good agricultural characters, have displayed vigour and resistance to drought and cold. The value of amphidiploids therefore consisted in their combining a wider range of characters and giving a pure progeny, a matter of great importance to the breeder. It has since been shown that amphidiploidy is one of the methods of speciation in evolution, notable examples being the origin of *Galeopsis tetrahit* and *Spartina townsendii*. Such amphidiploids are found to have a greater range of distribution than their diploid ancestors, by virtue of their being hardy with valuable ecological characters.

Though the clue for making use of the sterile species hybrids was inferred early enough, various attempts to double the chromosomes by heat and cold treatments gave uncertain results. With the discovery in 1937, by Blakeslee and Avery that the alkaloid colchicine has a specific effect in inducing polyploidy in dividing tissues, an important advance can be said to have been made in interspecific hybridisation. It now remains for the breeders in India to explore its possibilities in economic plant breeding.

The recent advances in genetical work also include the analysis of the cytological changes involved in the origin of various species. In addition to chromosome duplication, gene changes, chromosome fragmentation, reciprocal translocations and inversions in the order of gene arrangement in the chromosomes distinguish the different species and it has been established that such changes could be induced artificially by X-rays. The scope in this line of work is unlimited though the results cannot be controlled as the changes induced are at random in a highly organised biological system. In the hands of the plant breeder it is quite a handy but speculative method of not only inducing new variations but also of breaking up undesirable combinations due to gene-linkage. In Madras and Mysore success in the obtaining of useful forms in rice and sugarcane respectively is already reported.

It is thus clear that the future of the application of the recent advances in genetics to the production of suitable forms of plants augurs immense possibilities. Work so far done in India is mostly on the major crops and much more remains to be done not only in them but also in other less prominent crops connected with food and other industries. Any modern successful breeding programme for obtaining improved forms will have to take into account the special needs of the various industries; for instance, good quality of oil in the oil seeds, purity and good sugar content in sugar-cane, fibre strength and length in fibre plants, quantity and quality of starch and protein in such cereals as sorghum for the malting industry and so on.

Scientific plant breeding has now become a powerful and indispensable tool for making agriculture more efficient and sufficiently flexible in meeting new demands and supplying the needs of men for food and raw materials. The money value of the gain in agricultural industry through the work of the breeders can never be estimated. Just as any new invention replaces the old or makes possible what was not achievable before, newer and better forms of plants will be constantly and continuously replacing the old forms as necessity arises. This

work is becoming one of the chief weapons in the battle that must be ceaselessly carried on against the destructive forces of Nature, especially diseases.

Like every other science the modern science of genetics is international not only in theoretical findings, but also in its practical application to agriculture. A great improvement in the productive efficiency will result by the establishment of the contemplated Bureaux of Plant Introduction in India on lines similar to that in the United States of America. In the future, the well-being of a nation will depend more and more on the vigour and adequacy with which it carried on the task of improving the forms of life on which it depends to feed, to clothe and house its people and also on the efficient means by which this improvement is made available to all its citizens. G. N. R. *Science and Culture* Vol. 7,No. 8, February 1942.

Sugarcane Ratooning.

Advantages and Disadvantages of the Practice.

By RAO BAHADUR T. S. VENKATRAMAN,

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The article in *Indian Sugar* for August 1941 by Dr. C. D. Agarwala entitled "Economic Aspects of Sugarcane Ratooning" is likely to attract the attention of sugarcane growers in our country. It may not, therefore, be without interest to indicate very briefly certain of the advantages and disadvantages connected with the ratooning of sugarcane.

Ratooning, it has to be admitted, is in vogue in most of the known sugarcane countries of the world. It is not practised in Java for the reason that the land tenure system there necessitates cane lands going back to paddy after the harvest of the cane crop. Even in India there are certain places like Hospet in the district of Bellary and elsewhere where ratoons have successfully been taken for as many as 10 to 12 years. Certain indigenous canes of North India did not lend themselves to ratooning but the Coimbatore canes which have now replaced them ratoon well and hence the grower is now tempted to adopt it.

Appreciable Saving in Costs. The saving in cultivation costs from ratooning is quite appreciable as mentioned in Dr. Agarwala's article. Secondly, ratoon crops mature earlier than plant crops of the same age and this should come in handy for the early part of the factory crushing season. But it has to be remembered, however, that ratoon crops need careful cultivation and attention to make them a success. In our country, on the other hand, the ratoon crops are often neglected.

In Australia, where ratooning is a standard practice on account of the high cost of labour in that country—special field implements have been devised to ensure that the crop left over for ratooning is properly harvested. The plants have to be cut low and well below ground level as the ratoons grow best when developed from the lower buds. In fact, one could walk over ratooned sugarcane fields in Australia, soon after ratooning without suspecting that the field has been ratooned. In Australia the sugarcane crop is not earthed up. It may be worthwhile importing certain of the field implements used in ratooning from Australia. Some of these are figured in an article in *Agriculture and Livestock in India*, in the issue for May 1936.

Varieties differ considerably in the manner in which they respond to ratooning and certain of the Coimbatore canes have been known to give as ratoons higher yields than even as plant crops. The capacity for ratooning is a character which can be worked into canes by selective breeding.

There is one serious warning, however, which persons in our land enthusiastic about ratooning have to bear in mind. In cases where the plant crop is affected by fungoid or other diseases, like mosaic, which find a lodging in the cane itself, the practice of ratooning will be disastrous, as it would lead to a rapid multiplication of the disease. The cane joint with its juicy contents is almost an ideal culture house for certain of these pathologic organisms. The same would apply also to certain pests which lodge in the stubbles and find in ratooning favourable conditions for rapid multiplication.

Discrimination Necessary. To conclude, it would appear that ratooning should be confined to tracts where proper cultivation practices including manuring prevail and where the plant crop is definitely known to be sound and healthy. It would be courting disaster if a deceased or poorly grown crop is allowed to ratoon. *Indian Sugar* Vol. 4, No. 10, October 1941.

ABSTRACTS

Ascorbic acid content of some varieties of Mexican peppers. Francisco Giral and Juan Senosiain. *Ciencia* (Mexico) 1, 258—9 (1940). The vitamin C content of 17 varieties of Mexican peppers, corresponding in a major part to the species *Capsicum annuum* L. and one of the species *Capsicum frutescens* L., determined. Variations ranging from 17·4 to 213·4 mg. per 100 gm. of fresh material were observed. The authors found that the ascorbic acid content was inversely proportional to the pungent power of the pepper. The pungency was assayed by dilution in water until no sharp taste was experienced by the tongue. The total N determinations demonstrated a direct proportionality to the pungent power and inverse proportion to the vitamin C content. Martin L. Peller. [*Chemical Abstracts* Vol. 35, No. 21, Nov. 10, 1941.]

Studies in tropical fruits. XI Carbohydrate metabolism of the banana fruit during ripening under tropical conditions. H. R. Barnell. *Ann. Botany* (N. S.), 5 215—47 (1941). The fresh weight of the whole finger fell throughout the ripening period, but most rapidly between 2—3 and 9—11 days after cutting the bunch. The pulp lost fresh weight till the third day, then increased in weight until the ninth day, after which a loss again occurred. The skin lost weight all through the period, but particularly quickly between the ninth day and eleventh day. The percentage of dry matter in the pulp decreased as the fruit ripened. Starch had fallen to small values at the "eating-ripe" stage while the total sugars rose to a peak value at the beginning of this stage. Sucrose attained its peak value at the beginning of the "eating-ripe" stage and then fell, while reducing sugars continued to increase in percentage amount until the fruit became over-ripe. Glycosidic-glucose, while present in small amount only, definitely increased during the "eating-ripe" and over-ripe stages. The non-starch fraction of the alcohol-insoluble substance is an important source of respirable material in both pulp and skin. In the pulp the C substrate for respiration is at some stages derived in part at least from sources other than the estimated carbohydrates. Titratable acid decreased in the pulp until the "sprung" condition was reached and then increased as coloring occurred, falling again during senescence. In the skin the percentage amount of dry matter increased all through the period of observation, but particularly during the "eating-ripe" and over-ripe stages. Rapid chemical changes in the fruit the first few hours after cutting under tropical conditions, indicate that rapid cooling is to be recommended. R. C. Burrell. [*Chemical Abstracts* Vol. 35 No. 21. Nov. 10, 1941.]

Retention of vitamins by dried fruits and vegetables. E. M. Mrak. *Fruit Products J.* 21, 13—15 (1941). Procedures used in the production of dried fruits and vegetables are discussed. The information available, concerning the effect of the

treatment on vitamin retention, is not extensive but there is sufficient evidence to indicate that certain procedures are desirable and others undesirable. And so: (1) Steam blanching tends to preserve vitamins A, B_1 and C in dehydrated vegetables. Rapid drying also favors the retention of vitamins in carrots and spinach (2) Sulfuring preserves vitamins A and C in dried fruits. It has no effect on riboflavin but tends to destroy vitamin B_1. (3) Dehydration is superior to sun-drying from the standpoint of vitamin retention. (4) Alk. dips have no destructive effect on vitamins A, B_1 and riboflavin. (5) Vitamin destruction in storage is related to temperature and time of storage, period and moisture content of the fruit. Sulfured cut fruits lose SO_2 more rapidly if stored at higher temperatures. As the SO_2 content decreases, darkening and loss of vitamins A and C by the fruit increase. Vitamin A destruction is rapid in fruit containing less than 400 p. p. m. of SO_2. Vitamin C is in all probability also lost as these changes take place. (6) The loss of SO_2 from fruit containing 18—20% moisture is much more rapid than from fruit containing 12—14% of moisture. Storage of fruit containing 12—14% moisture would retard the loss of SO_2 and hence the deterioration of vitamin A and probably C. Edward A. Ackermann. (*Chemical Abstracts*. Vol. 35 No. 21 Nov. 10, 1941.)

Vitamin A content of cows' butter and ghee and buffalo ghee. B. N. Majumdar. *Indian J. Vet. Sci. Anim. Husb.* 11, 329 (1941). Ten samples of fresh cows' butter and ten samples of ghee prepared from this butter were analysed for their vitamin A and carotene contents by the spectrophotometric method. The vitamin A value of the cows' butter was found to be from 15 to 20 I. U. per gm. of fat and the carotene content from 3 to 12 I. U., the total vitamin A potency being about 11,800 I. U. per pound of butter. The vitamin A content and the carotene values of ghee prepared from the above butter ranged from 10 to 17 I. U. and from 2 to 9 I. U. per gm. respectively. The moisture content of the butter samples varied from 13 to 20 per cent. The loss of vitamin A actively during the preparation of ghee was on an average 17·4 per cent and depended on the temperature and period of heating. Eighteen samples of buffalo ghee were also analysed. The vitamin A values ranged from 1 to 3·5 I. U. per gm. Traces only of carotene were present. (Author's summary).

Acacia leucophloea and Acacia alba. K. C. Jacob. *Indian Forester*, Vol. 68, (1942). Plants of the genus *Acacia* are used in medicine in India, especially *Acacia arabica*, and *A. leucophloea*. The former has dark barks while the latter has white barks. Two species of *Acacia* with white barks are found in India—one found distributed throughout the Madras presidency except the Telugu districts known as *velvelam* in Tamil, and the second found in the Telugu districts and known as *tella tooma* there. These are two different species and may be recognised by the following characters:

	Acacia leucophloea. Willd (Tella tooma).	*Acacia alba*. Willd.
1.	Branches spreading	Branches erect.
2.	Panicles slender, spreading, drooping and pubescent.	Panicles stout, erect and tomentose.
3.	Heads 4 mm. in diameter.	Heads 6 mm. in diameter.
4.	Pedicels slender, pubescent.	Pedicels stout, tomentose.
5.	Calyx triangular.	Calyx trapezoidal.
6.	Corolla 1·25 mm. long.	Corolla 1·5 mm. long.
7.	Pod glabrous and sometimes shining.	Pod clothed with pale brown tomentum.

N. K.

EXTRACTS

The effect of cooking on the nutritive value of vegetables.

By MAMIE OLLIVER

Vegetables should be used as soon as is practicable after harvesting.

Waste in preparation of vegetables should be reduced to a minimum and with green vegetables, only tough stems and badly wilted leaves should be removed. Root vegetables can be cooked either very thinly peeled or unpeeled.

Green vegetables should be boiled rapidly for the shortest possible time in the minimum amount of water. The cooking liquor should be used for soups and gravies.

Root vegetables can be boiled, steamed, baked, or fried, but the need for avoiding excess cooking applies as to green vegetables.

"Keeping hot" of cooked green or root vegetables should be most rigorously avoided. This is probably the most important of all the factors considered.

Salt is to be advised in the cooking of vegetables since it improves the palatability of the tissue and does not increase the loss of nutritive value.

The use of soda for keeping the green colour of leafy vegetables cannot be condemned until the practical effects on vitamin B_1 destruction have been more fully investigated.

In conclusion, it should be stressed that it is not always possible to judge the nutritional value of a food stuff from its chemical analysis. Questions of palatability and of digestion and absorption must also be taken into consideration. The effect of cooking on the digestibility of vegetables and on the absorption of the nutrient constituents of vegetables has been given too little study in the past. It is to be hoped that this aspect of vegetables as a food will receive more attention, so that the nutritional value of cooked vegetables can then be more fully assessed. *Chemistry and Industry*, Vol. 60, No. 32, August, 1941.

Gleanings.

Sweet-potato Flour. Colonies and dependencies in the West Indies and elsewhere having climatic conditions suited to the sweet potato may be interested in the news that a successful process for dehydrating the Porto Rico sweet potato has been developed by the South Carolina Agricultural Experiment Station. The process gives a sweet potato flour of yellow orange colour that is palatable, adaptable in recipes as a substitute for the raw vegetable and is capable of indefinite storage without moulding or similar spoilage. It also has the valuable property, rare amongst starchy foods, of having a high content of provitamin A, averaging about 12,000 micrograms of carotene per hundred grams. Baked goods such as biscuits, muffins, pastry and cake in which from 12 to 22 per cent. of this flour had been incorporated are stated to have contained from 1,400 to nearly 3,400 micrograms of carotene per hundred grams when fresh, and practically as much after three weeks' storage. Costs of production are not available, but the material would seem to be a useful addition to the world's supply of food-stuffs, and its special attributes appear to justify its serious consideration for importation into the United Kingdom during the present crisis from political as well as nutritional view points. [*Food Manufacture*, Vol. 26, No. 12, December 1941.]

Power Alcohol from Sugar. A committee which has investigated the production of power alcohol reports that the three existing distilleries at Sarina (Queensland), Pyrmont (N. S. W.) and Yarraville (Victoria) are using all the molasses available, and it suggests the use of raw sugar to supplement output by keeping the distilleries at their full capacity continuously. This would add four or five million gallons a year to the total production, which is expected, in any event, to reach four million gallons by the end of the year. Four and a half million gallons of power alcohol could be produced from 36,000 tons of sugar. [*Food Manufacture*, Vol. 26, No. 12, December 1941].

New Food from "Amla". A new food from the Indian goose berry (*amla*)* is being manufactured at the Nutrition Research Laboratories, Coonoor. Large quantities of gooseberries are arriving from the neighbouring districts and these are being powdered here and then sent to other parts of India for conversion into tablet form. The new food is intended, among other purposes, to be sent to famine camps and desert areas where vegetables cannot be obtained. [*Food Manufacture*, Vol. 26, No. 12 December 1941].

Activated Carbons in the Refining of Sugar. At the meeting of the Sugar Division of the American Chemical Society, E. W. Harris presented a paper on activated carbon for use in the refining of sugar.

Activated carbons, as we know them today, are vastly different from the decolorising charcoals employed in the beginning of the eighteenth century in Europe. Much research has been done during the past decade, with the result that activated carbons having high efficiency are employed almost universally in the refining of sugar.

While activated carbons are employed extensively in many fields other than sugar refining, this paper is confined primarily to their use in the sugar industry. In the processing of beet, cane and corn sugar syrups, the requirements of an activated carbon are much the same.

In the manufacture of activated carbons, a wide variety of raw materials is used, and the processing so controlled as to give them the necessary properties for the absorption of objectionable impurities in sugar syrups.

The refining value of an activated carbon is not necessarily determined by its ability to remove colour, but by its capacity to adsorb colloids and other impurities, many of which are colourless. In the application of activated carbon in refining, a two-and three-stage counter-current method is employed, thereby reducing to a minimum the amount of carbon needed.

Activated carbons are selective in their power to adsorb impurities from solutions, and it has been found that they will remove molasses-forming compounds from sugar syrups. This is of great importance because of its effect on crystallisation. Such impurities not only retard the rate of crystallisation, impair the character of the crystal, but reduce the yield of crystallisable materials. These molasses forming impurities are largely organic materials and therefore are readily adsorbed by the carbon. [*Fcod Manufacture*, Vol. 26, No. 12, December 1941.]

Fruit Salads and Flannel Shirts. Until recently nobody would have thought of associating the two, but now a use for the papaw has been found which provides a link between textiles and the fruit industry. Papaws, for long appreciated by the "inner man" wherever they are obtainable, are now likely to be appreciated by the "outer man" as well. The tremendous demand for unshrinkable wool for clothing for our fighting men has started studies of every process likely to

* *Emblica officinalis.*

lead to stopping shrinkage in woollen goods. A lifeline for the wool industry (says the Queensland Agricultural Journal) may be provided by two remarkable developments, in both of which there figures an extract of the Queensland papaw. They are an anti-shrinking process and the taking of the "tickle" out of woollens. It is believed that when military requirements cease to be our first consideration, these developments will strengthen tremendously the position of wool in the textile world.

The anti-shrinkage process gives the finer wools a greater range of usefulness than they had until now, and also permits woollens to be washed in the same way as cotton garments are. The process (says the same source) is developing amazingly in the manufacture of army clothing, and it will be ready for immediate application to ordinary trade purposes when the war is over. Every week, 500,000 pairs of socks for the services are being treated at a cost of only a penny a pair. The process is called the enzyme process, since it depends on enzymes present in the fruit; it gives a silkiness and a softness to woollens such as had never been known before. [*Food Manufacture* Vol. 26, No. 12, Dec. '41.]

Press Notes.

How to enrich the different kinds of soils in the Madras Presidency.*

In the previous talks the ways and means for the increase of food crops and paddy yields were dealt with. There, it was mentioned that the increase and maintenance of soil fertility form the main plank for increased production. It is therefore necessary to state how the former could be secured for the different kinds of soil.

The increase and maintenance of soil fertility has to be done judiciously as different crops remove different kinds and quantities of plant food ingredients from the soil. Further, there is the loss of fertility under natural conditions, and this depends on the nature of the soil, for instance the sandy soils, the weather conditions of the tract, the amount of rainfall, the lay of the land, for example the West Coast lands and the manner in which the land is cultivated, cropped and left exposed to weather conditions, as is generally noticed in dry lands. For purposes of this subject, soils may broadly be classified under irrigated and un-irrigated i. e., purely rainfed. Let us take first into consideration the irrigated soils. Here there is generally intensive cultivation with two or more crops coming in an year. Consequently there is a greater drain of fertility from these soils and all the more so it is necessary to replenish it. From analysis, it has been found that our soils are greatly in need of organic matter, which is mostly responsible for supply of an important plant food ingredient namely nitrogen and that phosphorous is also wanting in most places. On account of extreme heat for a greater part of the year, a good deal of organic matter is burnt up or lost year after year. So it should be the aim of the ryot not only to return to the soil what has been removed by a crop but also make good the natural loss mentioned above. For example, an acre of paddy crop is estimated to remove from the soil 48 lb. of nitrogen, 23 lb. of phosphoric acid and 41 lb. of potash; a tobacco crop removes 67 lb. of nitrogen, 9 lb. phosphoric acid and 85 lb. of potash. A good crop of sugar cane has been found to require 100 to 150 lb. of nitrogen. Root crops like potatoes, yams, etc., require plenty of potash. As a rule, plants require nitrogen for development of leaf and stem, phosphate for production of grain and lime and potash to secure rigidity in the

* Substance of a 'Radio talk' in Telugu and Tamil from the All India Radio Stations, Madras and Trichinopoly.

plant and taste in the product. Thus it can be seen that to maintain the fertility of a soil, it is necessary that one does not grow the same crop year after year, though no bad effect is noticed at first; that a manure which supplies more of a particular plant food ingredient like nitrogen or phosphoric acid or potash or any two of them should be applied to a particular crop; that a judicious scheme of cropping and manuring is needed; that organic manures like cattle manure, green manures, cakes, etc., are indispensable; and that artificial manures alone, i. e., salts sold by manure firms can never improve soils. Let us now consider about the rainfed lands. The above rules apply here also in general but for want of a regulated supply of moisture concentrated manures cannot be applied to obtain economic results. On the top of it, for want of strong bunds and good arrangement of beds or furrows, as in irrigated lands, there is greater chance of surface soil being washed away, after every heavy rainfall. It is in this soil that a greater part of plant food useful for the plant exists as a result of our cultural operations and weathering action and application of manure. Thus the dry land ryot has to protect his surface soil from erosion in addition to constant replenishing of organic matter which is depleted from the soil annually on account of the removal of a crop and strong weathering action mentioned in the beginning.

Now coming to concrete cases, the following items are recommended to the farmer:—

1. Improve the quality and quantity of cattle manure. This is best achieved by sticking on to the principle that you put back into your land, as far as possible, every drop of cattle urine, every chip of cattle dung and every bit of organic matter.

2. Increase the organic content of the land. This can be done not only by the application of cattle manure but by raising green manure crops in wet and garden lands in rotation with the usual crop and ploughing them *in situ*. If the latter operation is not possible on account of the land having become dry, the crop can be cut, composted and applied later. Every bit of organic matter, soft or hard should be composted, leisure hours being spent on this work. It is wise to set apart cattle manure and farm compost to the dry lands and manage with green manure crops and concentrated manure in wet and garden lands.

3. Protect your surface soils from erosion. This is particularly necessary in your dry lands. Bund forming, contour ploughing, sowing in strips with tall growing and spreading crops and construction of field weirs for excess water to escape are the main points to be adopted in checking soil erosion.

4. Maintain the phosphatic level in the manurial ingredients of your soils by the application of cheaply available indigenous substances, such as bone meal. This can easily be managed by sprinkling between layers of cattle manure, bone meal at the rate of half a bag or 56 lb. for every 10 cart loads of the former, the manure heap or pit being protected from sun and rain. These suggestions are quite practicable to an ordinary *ryot*. If, however, some money is wanted, in the actual execution of the details contained therein, take by all means the advice and help of the Agricultural, Co-operative and Revenue Departments, and increase the fertility of your lands, as in this lies the entire secret of farming. Without good farming and increased production, our country with its increasing population cannot be above need of food and hence abide by the above earnest advice.

Crop and Trade Reports.

Statistics—Paddy—1941-42—Final forecast report. The average of the areas under paddy in the Madras Province during the five years ending 1939-40 has represented 13·1 per cent. of the total area under paddy in India.

The area sown with paddy in 1941-42 is estimated at 10,333,000 acres as against 10,467,000 acres for the corresponding period of the previous year and the finally recorded area of 10,744,393 acres in 1940-41. The present estimate falls short of the final area of the previous year by 3·8 per cent. but exceeds the area of 10,121,940 acres in a normal year by 2·1 per cent.

1,596,000 acres have been reported as sown since the last December forecast was issued, made up of 453,000 acres in the Carnatic, 379,000 acres in the South, 310,000 acres in the Circars, 253,000 acres in the Central Districts, 162,000 acres in the Ceded Districts and 39,000 acres in the West Coast and Hills. The area sown in December 1941 and January 1942 was greater than that sown in the corresponding period of the previous year by 57,000 acres or by 3·7 per cent. The area under second crop paddy is expected to be normal owing to the generally good North-east monsoon rains.

The area is the same as that of last year in the Nilgiris. An increase in area is revealed in Guntur, Bellary, Chingleput, South Arcot, Coimbatore, Tanjore, Madura and Tinnevelly and a decrease in area in the other districts of the Province, especially in Vizagapatam (–123,000 acres), East Godavari (–66,000 acres), West Godavari (–82,000 acres) and North Arcot (–51,000 acres). The area estimated for Guntur, Bellary and Tanjore is the highest reported in recent years. The harvest of the main crop of paddy is in progress.

The crop was affected to some extent by the cyclone in December 1941, in parts of Chingleput and South Arcot, by insufficient rainfall in parts of Vizagapatam, East Godavari, West Godavari, Kistna and Ramnad and by the attacks of insects in parts of Anantapur, Coimbatore, Trichinopoly and Ramnad. The yield per acre is expected to be above the normal in Guntur, Bellary and Salem (110 per cent. in each) and Madura, normal in Nellore, Tanjore, Tinnevelly, Malabar, South Kanara and the Nilgiris and below the normal in the other districts. The seasonal factor for the Province works out to 97 per cent. of the average as against 95 per cent. in the season and crop report of the previous year. On this basis, the yield works out to 101,594,000 cwt. of cleaned rice, as against 100,540,000 cwt. of cleaned rice for the corresponding period of the previous year, representing an increase of 1·0 per cent. and 103,007,000 cwt. of cleaned rice estimated in the Season and Crop Report of the previous year, representing a decrease of 1·4 per cent. The yield in an average year is estimated at 101,724,000 cwt. of cleaned rice.

The wholesale price of paddy, second sort, per imperial maund of 82⅔ lb. equivalent to 3,200 tolas as reported from important markets on the 9th February 1942 was Rs. 3—11—0 in Tinnevelly, Rs. 3—10—0 in Vizianagram, Rs. 3—9—0 in Bezwada, Rs. 3-8-0 in Rajahmundry, Ellore, Masulipatam, and Guntur, Rs. 3-7-0 in Virudhunagar, Rs. 3—6—0 in Cocanada, Rs. 3—5—0 in Chittoor, Rs. 3—4—0 in Mangalore, Rs. 3—3—0 in Trichinopoly, Rs. 3—2—0 in Anantapur, Rs. 3—1—0 in Hindupur and Vellore, Rs. 3—0—0 in Madura Rs. 2—15—0 in Conjeevaram and Kumbakonam, Rs. 2—12—0 in Negapatam, and Rs. 2—10—0 in Cuddalore. When compared with the prices published in the last report, i. e. those which prevailed on the 5th January 1942, the prices reveal a rise of about 18 per cent. in Conjeevaram, and 2 per cent. in Bezwada, Masulipatam, Guntur, Hindupur and Tinnevelly and a fall of about 23 per cent. in Vellore, 16 per cent. in Cuddalore, 14 per

cent. in Madura, 12 per cent. in Chittoor, 11 per cent. in Anantapur and Kumbakonam, 9 per cent. in Trichinopoly, 8 per cent. in Rajahmundry and Negapatam, 4 per cent. in Cocanada, 3 per cent. in Ellore and 2 per cent. in Mangalore, the prices remaining stationary in Vizianagaram and Virudhunagar.

Statistics—Cotton—1941-42—Fourth forecast report. The average of the areas under cotton in the Madras Province during the five years ending 1939-40, has represented 9·7 per cent. of the total area under cotton in India.

The area under cotton upto the 25th January 1942 is estimated at 2,472,800 acres. When compared with the area of 2,320,600 acres estimated for the corresponding period of last year, it reveals an increase of 6·6 per cent.

Four hundred and thirty-six thousand and six hundred acres have been reported as sown since the last December forecast was issued. This extent comprises chiefly 273,000 acres under Tinnevellies including Karunganni in Coimbatore, 103,600 acres under Cambodia, 35,000 acres under Western, 10,000 acres under white and red Northerns, 8,000 acres under Warangal and Cocanadas, 5,300 acres under Salems and 1,700 acres under other varieties. The area sown in December and January is less than that sown in the corresponding period of the previous year by 9,700 acres or by 2·2 per cent.

The increase in area in the current year as compared with the area in 1940-41, occurs in all the important cotton growing districts of the Province outside Guntur, Kurnool, Nellore, Ramnad and Tinnevelly. The variations are marked in Kurnool (−49,500 acres), Salem (+23,400 acres), Coimbatore (+14,200 acres), Madura (+35,000 acres) and Tinnevelly (−24,500 acres). The area estimated in respect of South Arcot and Coimbatore is the highest reported in recent years.

The area under irrigated cotton, mainly Cambodia, is estimated at 303,100 acres as against 280,900 acres estimated for the corresponding period of the previous year, an increase of 7·9 per cent.

Pickings of the mungari or early sown cotton crop in the Deccan are nearing completion. The yield was below normal due to insufficient rainfall.

The crop was affected by drought in parts of Vizagapatam, Kistna, Bellary and Anantapur. Normal yields are reported from all the districts except Vizagapatam, Kistna, Kurnool, Bellary, Anantapur and South Arcot where the yield is reported to be below normal.

The seasonal factor for the Province as a whole works out to 97 per cent. of the average as against 96 per cent. in the previous year. On this basis, the total yield is estimated at 563,800 bales of 400 lb. lint as against 513,200 bales for the corresponding period of the previous year. It is, however, too early to estimate the yield with accuracy as the harvest has not yet commenced in the major portion of the area and much will depend upon the future weather conditions and the toll taken by insect pests.

The estimated area and yield under the several varieties are given below :—

(Area in hundreds of acres i. e., 00 being omitted ; yield in hundreds of bales of 400 lb. lint i. e., 00 being omitted).

Variety.	Area from 1st April to 25th January.		Corresponding yield.	
(1)	1941—42 (2) Acres.	1940—41 (3) Acres.	1941—42 (4) Bales.	1940—41 (5) Bales.
Irrigated Cambodia	2901	2639	1813	1591
Dry Cambodia	3208	2384	675	499
Total, Cambodia	6109	5023	2488	2090

Uppam in the Central Districts	217	172	35	27
Nadam and Bourbon	330	263	17	12
Total, Salems	547	435	52	39
Tinnevellies (a)	6810	6483	1714	1550
White and Red northerns	1400	1830	170	217
Westerns	8700	8160	1002	1004
Warangal and Cocanadas	1082	1190	202	221
Chinnapatti (Short staple)	80	85	10	11
Total ..	24728	23206	5638	5132

(a) Includes Karunganni cotton grown in the Coimbatore district and Uppam, Karunganni and mixed country cotton grown in the South.

The average wholesale price of cotton lint per imperial maund of 82⅔ lb. equivalent to 3,200 tolas as reported from important markets on the 9th February 1942 was about Rs. 16—7—0 for Cocanadas, Rs. 20—9—0 for White Northerns, Rs. 18—2—0 for red Northerns, Rs. 16—10—0 for Westerns (Mungari) Rs. 21—3—0 for Westerns (Hingari) Rs. 36—8—0 for Coimbatore Cambodia, Rs. 32—8—0 for Coimbatore Karunganni and Rs. 24—11—0 for Nadam cotton. When compared with the prices published in the last report i. e. those which prevailed on the 5th January 1942, these prices reveal a rise of about four per cent. in the case of Westerns (Hingari) and a fall of about 13 per cent. in the case of Nadam cotton and 12 per cent. each in the case of Coimbatore Cambodia and Coimbatore Karunganni, the prices remaining stationary in the case of Cocanadas and Westerns (Mungari). (*Director of Industries and Commerce, Madras*).

Cotton Raw, in the Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February to 13th March 1942 amounted to 32,757 bales of 400 lb. lint as against an estimate of 441,100 bales of the total crop of 1941-42. The receipts in the corresponding period of the previous year were 42,460 bales. 73,355 bales mainly of pressed cotton were received at spinning mills and 1,062 bales were exported by sea while 37,830 bales were imported by sea mainly from Karachi and Bombay.

(Director of Agriculture, Madras.)

Mofussil News and Notes.

Nandikotkur. An agricultural exhibition and cattle show was held at Cam balapalle from the 13th to 15th of February 1942 during *Mahasivaratri*. Improve agricultural implements, seeds and manures were exhibited with explanator notes. Models of manure pits and posters were put up. About 50 pairs of goo cattle were brought to the cattle show by the *ryots* of the neighbouring villages

B. R.

The Nilgiris. The annual 'Health Week' celebrations, a conference of *ryot* and a rural exhibition were held at Devarshola, Gudalur Taluk, on the 26th an 27th of January 1942. Speeches stressing the importance of increased food pro duction and helping the Government's war effort, improvement of livestock and prevention of infectious diseases like small pox, etc, were made at the confer ence which was well attended. Prizes were distributed to the winners in th 'Health Week' Competitions.

Rural Reconstruction:— The prize distribution for the rural construction work on the Nilgiris took place on the 16th January in the maidan near Edapal village. An address of welcome was presented to the Collector who distribute the prizes. After a short display by the scouts of the Higher Elementary Sch Edapalli, and dance and *Kolattam* by the pupils of the Girls' School, Illithor

the Collector presented the shield to Edapalli village as the best model village for rural reconstruction work in the district. The Collector thanked the villagers for their address and said that only by a very narrow margin Edapalli village has won the shield as it was very difficult for the judges to decide between Edapalli and Illithorai. With a hearty vote of thanks the function came to a close. P. A. N.

Puliventla. An agricultural exhibition during the harvest festival was held on the 3rd and 4th March in the Puthainipeta village. It was well attended. S. V.

Tiruchengode. An agricultural exhibition was held at Kalipatti, from 30th January to 3rd February 1942 in connection with the *Thai* '*Poosam*' festival. The exhibits included improved implements suited for the various local conditions, manure preservations, improved strains of paddy, cotton, millets and oil seeds. Very instructive posters on agricultural subjects were put up. Lectures were delivered on agricultural improvements and on methods to be adopted for increasing the area under food crops in the taluk as a war measure. Leaflets on various agricultural subjects were distributed free to the visitors. S. D.

Samalkota. The Director of Agriculture met the District officers and staff at the Agricultural Research Station, Samalkota and spoke to them to do propaganda in connection with the increase of the area under food crops as a war measure. He also addressed a large gathering of *ryots* at Anaparti on this subject. M. S.

Kadiri. An agricultural exhibition was held during the local Car festival from the 5th to 10th March. Improved strains of paddy, jonna, ragi, sugarcane, korra, fodder grasses, green manure and specimen crops in pots, groundnut decorticators, tillage implements, illustrated posters on agricultural matters, bee-keeping appliances and machinery used in the control of insect pests and diseases were exhibited during the occasion. A large number of *ryots* from the neighbouring taluks also visited the show. M. K.

Pattikonda. An agricultural exhibition and a cattle show were organised at Peravali from 5th to 8th March 1942. Messrs. P. V. Madhava Rao & Sons, Panyam, kindly supplied good budded and grafted specimen plants and their marmalades and pickles. Various fruits of a local departmentally supervised garden were also exhibited. English vegetables, fodder grasses and *ragi* malt were on show. The departmental exhibits included various improved agricultural and horticultural implements, chemicals for combating insects and fungi, strains of paddy, korra, jonna, cotton, castor, gingelly, groundnut, bengal gram, posters and models of combined manure pits and cattle sheds, specimen crops of green manures and seeds of the same were put on show. Proper preservation of cattle manure was demonstrated. S. L.

Estate News.

Agricultural College and Research Institute. Rao Bahadur Sri G. N. Rangaswami Ayyangar went on leave preparatory to retirement from 10—3—1942 and handed over charge of the Office of Principal to Sri P. Venkataramayya, Government Agricultural Chemist, that of the Millets Specialist to Sri C. Vijayaraghavacharya and that of the Geneticist to Sri S. N. Chandrasekhara Ayyar, Lecturer in Botany.

The Botanical Section has been made an independent one and the Lecturer in Botany made the Head of Botany with charge of the Herbarium.

M. Sc. Degree—University of Madras. We offer our hearty congratulations to Sri M. Mohan Rao, B. Sc. Ag., on the award of M. Sc. Degree to him for his thesis

on "Some factors governing fruit-bud formation in mangoes—Studies on certain aspects of growth and flowering in relation to productivity".

Honey Week. The Government Entomologist, Agricultural College and Research Institute, organized the "Honey Week" at Coimbatore at the Union High School on the 5th of March. Mrs. A. D. Crombie, wife of the Collector of Coimbatore, inaugurated the "Honey Week" and opened the "Bee Exhibition". The exhibition was open to the public till the 8th of March.

Association of Economic Biologists, Coimbatore. D. N. Mahta Esq., B. A. (Oxon.), Secretary, Indian Central Cotton Committee, delivered a very interesting and thought provoking lecture on "Grow more food crops." under the auspices of the Association, on the 10th March. Rao Bahadur V. Ramanatha Ayyar, Cotton Specialist and President of the Association, presided.

Scouting. With the funds provided by Rao Bahadur Dr T A. Raja, M. B. E., District Scout Commissioner, the cubs of the Ramakrishna Scout Group numbering 35 camped out at the Botanic Gardens on 7th March 1942. The Coimbatore District Scout Council held that evening at the camp site a rally of all the cubs from Coimbatore. A large and distinguished gathering of visitors was present and all the cub packs present for the rally gave displays which were very much appreciated. Dr. Raja congratulated the scouters of the Ramakrishna Scout Group on the excellent progress they are maintaining.

St. John Ambulance Brigade. The A. C. R. I. Ambulance Division held a ceremonial parade at the Agricultural College on 11th March 1942 for the distribution of First Aid certificates to 38 candidates. An interesting demonstration of rendering first aid to certain "Air Raid casualities" was also given. Mr D. Natarajan, Divisional Superintendent, requested Mr. A. C. Hensman, the Special A. R. P. Officer, Coimbatore, who presided, to distribute the certificates. In his address, the President congratulated the Division on their excellent turn out and for their rendering first aid to the "casualities" so quickly, correctly and calmly. He appealed to the audience to join the A. R. P. services in very large numbers. Dr. K. Narayanan, Divisional Surgeon, proposed a vote of thanks.

Visitors. H. M. Hood Esq., C. S. I., C. I. E., I. C. S., Adviser to H. E. the Governor of Madras, visited the Agricultural College and Research Institute on the 15th of March.

D. N. Mahta Esq. B. A. (Oxon.), Secretary, Indian Central Cotton Committee, camped at the College on the 9th and 10th of March.

Departmental Notifications.

Gazetted Service.

Postings

Sri R Balasubramania Ayyar, on return from leave is posted as Gazetted Assistant, Cocanadas Cotton Improvement, Narasaraopet.

Sri C. Jaganatha Rao, Gazetted Assistant, Cocanadas Cotton Improvement Scheme, Narasaraopet is posted as Assistant in cotton.

Transfers.

Name of officers.	From	To
Sri A. Ramaswami Ayyar,	D. A. O., *(on leave)*,	D. A. O, Vellore.
,, K. Jaganatha Rao,	D. A. O., Vellore,	D. A. O. Vizagapatam.

Subordinate Services.

Appointments.

Mr. Khasim Adeni Sahib is re-appointed as Upper Subordinate, Science Section, and is posted to officiate as Assistant in the Millets Section, Coimbatore

Sri K. R. Nagarajan, is re-appointed as Upper Subordinate, Science Section and is posted to officiate as Assistant in the Mycology Section, Coimbatore.

Sri Shivashankar Rao Gangooly, Madras Agricultural Subordinate Service on the conclusion of work in the Taxonomy scheme is appointed to officiate as Assistant in the Fruit Specialist's Section, Koduru.

Transfers

Name of officers	From	To
Sri P. Uthaman,	Asst. Orissa Rice Scheme, Cuttack,	Asst. in Paddy.
Dr. C. Narasimha Acharya,	Asst. in Chemistry at the Indian Institute of Science, Bangalore,	Asst. in Chemistry Section, Coimbatore.
Sri P. S. Venkatasubramanian,	P. M. A. R. S., Tindivanam,	A. D., Ginjee.
,, L. Krishnan,	A. D., Tindivanam,	F. M. A. R. S., Palur.
,, S. Ananthan Pillai,	F. M. A. R. S., Palur,	A. D., Ambasamudram.
,, K. Meenakshisundaram,	A. D., Ambasamudram,	A. D., Tindivanam.
Janab P. P. Syed Muhammad Sahib,	A. D., Tirupur,	A. D., Lalgudi.
Sri M. Kalimuthu,	Teaching Assistant, Agriculture, Coimbatore,	A. D., Chidambaram.
,, C. S. Krishnaswami,	A. D, Chidambaram,	Teaching Asst., Agriculture, Coimbatore.
,, P. A. Narayana Nambiyar,	A. D., Omalur,	F. M., Nileshwar.
,, P. M. Appaswami Pillai,	A. D., Attur on leave	A. D., Omalur.
,, D. Bapayya,	Under the Tobacco Market Committee, Guntur,	A. D., Nellore Dt.
,, N. Sobhanadri,	do.	A. D., Kalahasti.
,, D. Achyutarama Raju,	do	A. D., Badvel.
,, K. L. Ramakrishna Rao,	A. D., Ponneri,	A. D., Tiruttani.
,, P. R. Subrahmanya Ayyar,	A. D., Tiruttani,	F. M., A. R. S., Koilpatti.
,, G. Doraiswami,	F. M. A. R. S., Koilpatti,	A. D., Koilpatti.
,, N. V. Kalyanasundaram Ayyar,	A. D., Puthur,	A. D. Chengam.

Leave.

Name of officers.	Period of leave.
Sri P. Vishnusomayajulu, Asst. in Mycology, Coimbatore,	Extension of 1 a. p. on m. c. for 4 months from 3—3—42.
K. Soopi Haji Sahib, A. D., Manjeri,	Extension of 1. a. p. for 2 months on m. c. from 2—3—42.

Sri Bennet P. Malsillamani, A. D., Devakottai,	L. a. p. for 1 month from 4—3—42.
„ C. Jagannatha Rao, Gazetted Asst., Cocanadas Scheme, Narasaraopet,	L. a. p. for 1 month from 1—3—42.
„ R. Krishnamurthi, A. D, Chengam,	L. a. p. on m. c. for 3 months from the date of relief.
„ C. S. Namasivayam Pillai, A. D., Ginjee	Leave on half average pay for 7 months and 14 days from the date of relief.
„ P. K. Kannan Nambiar, F. M. A. R. S., Nileshwar,	Extension of l. a. p. for 3 months from 19—1—42.
„ T. V. Krishnaswami Rao, A. D., Vizagapatam.	L. a. p. on m. c. for 2 months from 11—2—42.
„ P. Uthaman, Asst. in Paddy,	L. a. p. for 2 months from 1—4—42.
Dr, C. Narasimha Acharya, Asst. in Chemistry,	L. a. p. for 1 month and 20 days from 12—2—42.
„ N. C. Thirumalachari, A. D., Koilpatti,	L. a. p. for 2 months from the date of relief.
„ B, Siva Rao, A. D. Tuni,	L. a. p. for 2 months from 1—4—42.